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21906 7590 01/24/2007 TROP PRUNER & HU, PC 1616 S. VOSS ROAD, SUITE 750 HOUSTON, TX 77057-2631			EXAMINER PHAM, THANHHA S	
			ART UNIT 2813	PAPER NUMBER
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**GROUP 2800**

**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/761,575  
Filing Date: January 21, 2004  
Appellant(s): ZHANG, YUEGANG

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Timothy N Trop  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/17/2006 appealing from the Office action  
mailed 08/08/2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is deficient. 37 CFR 41.37(c)(1)(v) requires the summary of claimed subject matter to include: (1) a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawing, if any, by reference characters and (2) for each independent claim involved in the appeal and for each dependent claim argued separately, every means plus function and step plus function as permitted by 35 U.S.C. 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference

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characters. The brief is deficient because a plurality of nanotubes ( reference 10, figure 28 or 27) are claimed – not reference 32 (the gate dielectric 32, figure 28) as being mentioned in the Summary of Claimed Subject Matter.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

No evidence is relied upon by the examiner in the rejection of the claims under appeal.

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 17-19, 21 and 28-31 stand rejected under 35 U.S.C. 102(e) as being anticipated by Nihey [US 2004/023887].

► With respect to claims 17-19, Nihey (figs 1-2, text pages 1-3) discloses the claimed transistor comprising:

a source region (3, text [0025]) [*claim 17*];

a drain region (4, text [0025]) [*claim 17*];

a plurality of nanotubes (2, text [0025]-[0035]) extending between said source and drain regions, said nanotubes having functionalized ends with attached functional groups (text [0029]: *nanotubes having ends electrically connected to the source and drain, said ends*

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*of nanotubes being functionalized (being made to function as electrical connection) with attached functional groups of source and drain) wherein said nanotubes (2) are parallel to one another and are spaces equidistantly from one another (see fig 2 for details) [claims 17-19]; and a gate electrode (6, text [0025]) over said nanotubes (2) [claim 17].*

► With respect to claims 28-30, Nihey (figs 1-2, text pages 1-3) discloses the claimed transistor comprising:

a source region (3, text [0025]) [claim 28];

a drain region (4, text [0025]) [claim 28];

a plurality of nanotubes (2, text [0025]-[0035]) extending between said source and drain regions, each nanotube including two opposed ends, the opposed ends having different functional groups (source and drain) attached to the opposed (text [0029]: *nanotubes having opposed ends respectively electrically connected to the source and drain, said opposed ends of nanotubes having different functional groups (source and drain are different functional groups) attached to the opposed*) wherein said nanotubes (2) are parallel to one another and are spaces equidistantly from one another (see fig 2 for details) [claims 28-30].

► With respect to claims 21 and 31, said nanotubes (2, fig 2) of Nihey have functionalized ends for the transistor's operation. Said nanotubes (2) of Nihey have opposed first functionalized ends coupled with said source region (3) and second functionalized ends coupled to said drain region (4), said first functionalized ends attracted to said source region and not said drain region.

Claims 22-27 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nikey [US 2004/0238887] in view of Luyken et al [US 2003/0148562].

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► With respect to claims 22-26, Nihey (figs 1-2, text pages 1-3) discloses the claimed transistor comprising:

a source region (3, text [0025]) [*claim 23*];

a drain region (4, text [0025]) [*claim 23*];

a plurality of nanotubes (2, text [0025]-[0035]) extending between said source and drain regions, said nanotubes having functionalized ends (text [0029]: nanotubes having ends electrically connected to the source and drain, said ends of nanotubes being functionalized (being made to function as electrical connection) wherein said nanotubes (2) are parallel to one another and are spaces equidistantly from one another (see fig 2 for details) [*claims 23-26*]; and

a gate electrode (6, text [0025]) over said nanotubes (2) [*claim 23*].

Nihey does not expressly mention in written the nanotubes are capless [*claim 22*] or open-ended [*claim 23*].

However, Luyken et al (text [0001]-[0146], particularly text [0038]) teaches the nanotubes used in a transistor can be either capless/open-ended or with cap/closed-end.

Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of Luyken et al, to select the nanotubes being capless or opened-end as being claimed as convenient nanotubes in the transistor of Nihey to provide conduction path for carriers between the source and the drain of transistor.

► With respect to claim 27, Nihey shows that nanotubes (2) have opposed first functionalized ends coupled with said source region (3) and second functionalized ends

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coupled to said drain region (4), said first functionalized ends attracted to said source region and not said drain region.

Claims 22-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nihey [US 2004/0238887] in view of Plefferle et al [US 2003/0148086].

► With respect to claims 22-26, Nihey (figs 1-2, text pages 1-3) discloses the claimed transistor comprising:

a source region (3, text [0025]) [*claim 23*];

a drain region (4, text [0025]) [*claim 23*];

a plurality of nanotubes (2, text [0025]-[0035]) extending between said source and drain regions, said nanotubes having functionalized ends (text [0029]: nanotubes having ends electrically connected to the source and drain, said ends of nanotubes being functionalized (being made to function as electrical connection) wherein said nanotubes (2) are parallel to one another and are spaces equidistantly from one another (see fig 2 for details) [*claims 23-26*]; and

a gate electrode (6, text [0025]) over said nanotubes (2) [*claim 23*].

Nihey does not expressly mention in written the nanotubes are capless [*claim 22*] or open-ended [*claim 23*].

However, Plefferle et al (text [0001]-[0073], particularly text [0006]-[0018], [0058]-[0064] & [0071]-[0073]) discloses nanotubes with ends being capless/open-ended and being functionalized as improved nanotubes with controllable physical and electronic characteristics that can be used in transistor.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to modify the transistor of Nihey by using the nanotubes with ends as being claimed, per taught by Plefferle et al, to provide a transistor with controllable electrical characteristic operation.

► With respect to claim 27, Nihey shows that nanotubes (2) have opposed first functionalized ends coupled with said source region (3) and second functionalized ends coupled to said drain region (4), said first functionalized ends attracted to said source region and not said drain region.

**(10) Response to Argument**

► With respect to Appellant's argument page 10 regarding to anticipation of Nihey, Appellant contends that rejection should be reversed since:

a) claim 17 calls for a plurality of nanotubes having functionalized ends with attached functional groups wherein "functionalized" and "functional groups" are the part of a compound that takes part in reactions;

b) claim 28 calls for different functional groups attached to the opposed ends, source and drains are basically the same material, just differently connected to the transistor, source and drains do not have different functional group.

Regarding to a), argument is not persuasive since Appellant does not claim functional groups are actually which specific group. Based on a broad scope of claims, functional groups are any groups that provide functions. Examiner rejects the claims under the broad scope wherein source and drain are functional groups that provide



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functions of source and drain in transistor's operation. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a compound that takes part in reactions as argument, or carboxylic group or amine group as in specification page 6 lines 8-20 ) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding to **b)**, source and drain are different functional groups (providing different functions in transistor) that are attached to the nanotubes. Therefore, Nihey still anticipates claim 28 – no matter source and drain of Nihey are formed of the same or different material since Appellant does not claim which material forming functional groups. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

► With respect to Appellant's arguments pages 10-11 regarding to obviousness of Nihey in view of Luyken or obviousness of Nihey in views of Plefferle, Appellant contends that there is no reason to use open-ended nanotubes in a transistor. The argument is not persuasive since Appellant uses open-ended nanotubes in transistor without mentioning criticality of open-ended nanotubes. In Examiner's view, open-ended (capless) nanotubes are convenient and known materials for use in transistor, and Luken and Plefferle et al are evidences that teaches using open-ended (capless) nanotubes in transistor. Luyken et al teaches the nanotube can have the ends being

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either open or close to use in transistor. Therefore, the choice of using open-ended/capless nanotube would be obvious for those skilled in the art, per taught by Luyken et al. In addition, Plefferle et al teaches using nanotubes with ends being capless/open-ended and being functionalized as improved nanotubes with controllable physical and electronic characteristics that can be used in transistor. The choice of using open-ended/capless nanotube would be obvious for those skilled in the art, per taught by Plefferle et al, to provide a transistor with controllable electrical characteristic operation.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

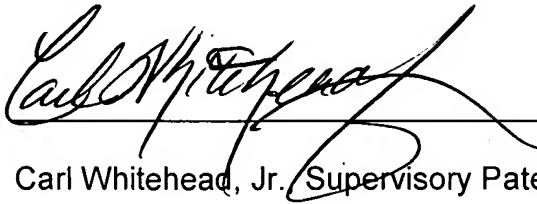
For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Thanhha Pham

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Conferees:



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Carl Whitehead, Jr. Supervisory Patent Examiner



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Ricky Mack, Supervisor Patent Examiner



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Thanhha Pham, Primary Examiner